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Oshima et al.

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[54] **MARK FORMING APPARATUS, METHOD OF FORMING LASER MARK ON OPTICAL DISK, REPRODUCING APPARATUS, OPTICAL DISK AND METHOD OF PRODUCING OPTICAL DISK**

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[52] U.S. Cl. **380/4; 369/272; 235/494**

[58] Field of Search **380/4; 369/272; 369/273; 286; 292; 52; 235/494**

[56] **References Cited****U.S. PATENT DOCUMENTS**

5,065,429	11/1991	Lang	380/25
5,191,611	3/1993	Lang	380/25
5,392,351	2/1995	Hasebe et al	380/4
5,400,403	3/1995	Fahn et al	380/21
5,457,668	10/1995	Hibino et al.	380/4
5,457,746	10/1995	Dolphin	380/4
5,513,169	4/1996	Fite et al	380/3

FOREIGN PATENT DOCUMENTS

0545472	6/1993	European Pat. Off	380/4
553545	8/1993	European Pat. Off	
4308680	10/1993	Germany	
61-190734	8/1986	Japan	
63-46541	2/1988	Japan	
63-164043	7/1988	Japan	
2-44448	2/1990	Japan	
5-325193	1/1991	Japan	380/4
5-266576	10/1993	Japan	
7-325712	12/1995	Japan	
9101358	3/1993	Netherlands	

OTHER PUBLICATIONS

European Search Report dated May 15, 1997.

International Search Report dated Jan. 30, 1996.

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[57] **ABSTRACT**

An object of the present invention is to provide a marking forming apparatus, a method of forming a laser marking on an optical disk, a reproduction apparatus, an optical disk, and a method of manufacturing an optical disk, capable of providing a greatly improved copy prevention capability as compared to prior known construction. To achieve this object, in the optical disk of the invention, for example, a marking is formed by a laser on a reflective film of a disk holding data written thereon and at least position information of the marking or information concerning the position information is written on the disk in an encrypted form or with a digital signature appended thereto.

27 Claims, 43 Drawing Sheets

